

Appln. No. 10/670,830
Amendment Filed July 19, 2005
Response to Office Action mailed January 19, 2005

REMARKS

Claims 1-24 are pending in this application and stand rejected. Claims 11 and 17 have been amended, in part, to make the changes which the Examiner said would overcome an objection thereto. Claims 1-3, 7, 11 and 17 are independent.

A Terminal Disclaimer has been submitted herewith.

The Objection to the Claims

Claim 17 was objected to on grounds the expression "The selective ink supply system" in line 1 should read --A selective ink supply system--.

The Examiner is thanked for calling attention to this point. Claim 17 has been revised as the Examiner proposed. Accordingly, favorable reconsideration and withdrawal of this objection are respectfully requested.

The Double- Patenting Rejection

Claims 1 and 2 were rejected under the judicially-created doctrine of obviousness-type double patenting as being unpatentable over claims 1 and 3 of U.S. Patent No. 6,648,459 B2, which is commonly assigned along with this application. The Office Action stated that a Terminal Disclaimer could be used to overcome this rejection.

In the interests of expediting prosecution, and without conceding the propriety of this rejection, Applicants submit herewith a Terminal Disclaimer to the '459 patent.

Given the submission of the Terminal Disclaimer, this rejection has been overcome. Accordingly, favorable reconsideration and withdrawal of this rejection are respectfully requested.

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**The Rejection Under
35 U.S.C. § 102**

Claims 3-10 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,514,742 to Suga et al. Applicants respectfully traverse this rejection, and submit the following arguments in support thereof.

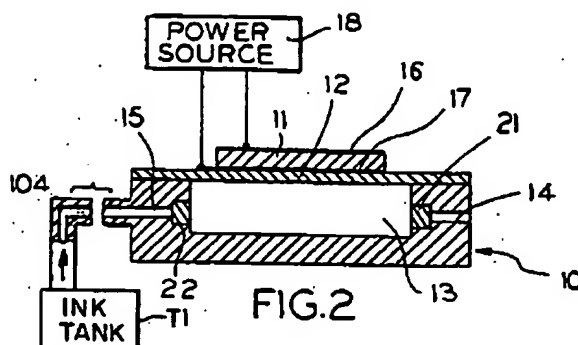
Independent claim 3 is directed to a valve unit to be placed in an ink supply channel of an ink-jet recording apparatus, the ink supply channel having an upstream portion and a downstream portion. The valve unit has a partition wall which, when the valve unit is placed in the ink supply channel, is located between the upstream portion and the downstream portion, the partition wall having an upstream side and a downstream side and a plurality of communication holes passing therethrough, each such communication hole providing fluid communication between the upstream portion and the downstream portion, and a diaphragm valve with a valve seat formed on the downstream side of the partition wall, and a flexible diaphragm. The diaphragm has an opening therethrough, and the flexible diaphragm is mounted so that the opening presses against the valve seat until a pressure difference across the valve reaches a predetermined value.

Claim 7, also independent, involves an ink cartridge with a container, a partition wall disposed within the container and dividing the container into an upper portion defining an ink chamber and a lower portion, the partition wall having an upstream side and a downstream side and a plurality of communication holes passing therethrough, each such communication hole providing fluid communication between the upstream portion and the downstream portion, and a diaphragm valve. The diaphragm valve has a valve seat formed on the downstream side of the partition wall, and a flexible diaphragm, the diaphragm having an opening therethrough, the

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flexible diaphragm being mounted so that the opening presses against the valve seat until a pressure difference across the valve reaches a predetermined value.

Applicants respectfully traverse the characterization of Suga in the Office Action on grounds Suga's valve (structures 21 and 22 and 22 in Fig. 2, and the more detailed structures in Figs. 3A-4B) does not have the same type of valve as the present invention. In Suga, the valves (21 and 22) as located such that one valve (22) is between ink supply passage 15 leading to the ink tank and the ink jet printer head (10), while the other valve (21) is located between the pressure chamber (13) and the and the nozzle (14).



Commenting upon these valves and how they are constructed, Suga states at col.

3, lines 36-58 (emphasis added):

Refer to FIG. 2 A first fluid control means 21 is disposed between the nozzle 14 and the pressure chamber 13. A second fluid control means 22 is disposed between the pressure chamber 13 and the supply passage 15. When the ink passes through the fluid control means, a pressure loss occurs. Herein, the ratio of the pressure loss to the flow rate of the ink (hereinafter, referred to as "flow resistance") changes, depending upon the direction [sic] of the passing ink stream. The fluid control means 21 and 22 operates so that the flow resistance may become low under the action of the pressure of the ink, in response to the ink stream in the direction from the supply passage side toward the nozzle side. Whereas, the flow resistance may become high under the action of the ink pressure, in response to the ink stream in the direction from the nozzle side toward the supply passage side.

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It is respectfully submitted that one skilled in the art would understand Suga's fluid control means 21 and 22 to be check valves which prevent the reverse flow of ink. Such check valves provide decreased fluid resistance in the desired direction of fluid flow, and increased flow resistance in the opposite direction of fluid flow (this way, ink flows toward the nozzle, not back to the ink tank). One skilled in the art also would understand that in such check valves, it is desirable for the valve not to hinder the forward flow of ink; ideally, the valve would open as soon as the slightest pressure differential across the valve occurs.

In contrast, the present invention, as set out in claims 3 and 7, provides that the flexible diaphragm is mounted so that the opening presses against the valve seat until a pressure difference across the valve reaches a predetermined value. In other words, the valve does not immediately open when there is a pressure differential across it; the valve only opens when that differential reaches the predetermined value.

The remaining rejected claims, claims 4-6 and 8-10, all ultimately depend from and so incorporate by reference all the features of independent claims 3 or 7, which independent claims have just been shown to patentably distinguish over the cited art. These dependent claims are therefore patentable at least for the same reasons as their respective base claims.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

**The Rejections Under
35 U.S.C. § 103**

Claims 1 and 2 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,010,211 to Betschon. Applicants respectfully traverse this rejection and submit the following arguments in support thereof.

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As described in claim 1, this invention involves a valve unit to be arranged in an ink supply channel of an ink recording apparatus. The valve unit has an entry port constructed to receive an ink needle and supply ink to the ink needle for use in recording, a valve mechanism adapted to be disposed in the ink supply channel defining an upstream side and a downstream side in the ink supply channel, and the valve unit is constructed to selectively permit and prevent the flow of ink without being pierced by the ink needle. A filter is disposed upstream from the valve mechanism.

Claim 2 is directed to a valve unit to be arranged in an ink supply channel of an ink recording apparatus, and the valve unit includes a valve mechanism adapted to be disposed in the ink supply channel defining an upstream side and a downstream side in the ink supply channel, and a filter disposed upstream from the valve mechanism. The valve mechanism is constructed to selectively open and close the ink supply channel as a result of a change in the pressure difference between the upstream side and the downstream side of the valve mechanism.

The Office Action admits that Betschon does not even suggest a filter be disposed upstream from the valve mechanism (Office Action, p. 11). The Office Action then contends it is well known in the art to dispose a filter upstream from a valve mechanism.

Keeping in mind the effective filing date of this application, Applicants do not believe that the specific location of a filter being disposed upstream from a valve mechanism is known in the prior art. Rather, the filter would be disposed downstream of the valve, as taught by U.S. Patent No. 5,691,753 (Col. 4, lines 60-65 and Fig. 2).

However, by providing such a filter in the manner now claimed, it is possible to prevent dust or air bubbles from entering into the valve mechanism, and therefore this filter serves to maintain the intended function of the valve mechanism.

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For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

Claims 11-24 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Betschon in view of Suga. Applicants respectfully traverse this rejection and submit the following arguments in support thereof:

Before addressing the merits of this rejection, Applicants wish to point out that the Office Action is in error insofar as it states the applied reference has a common inventor with the instant application (Office Action, page 13). First, the Office Action speaks of a single reference, whereas two references were applied in this rejection. Second, neither of the applied references, Betschon and Suga, has an inventor who also is an inventor of the subject application.

As set out in claim 11, this invention also relates to an ink tank unit for detachable mounting on a connecting member of an ink jet recording apparatus and which can contain an ink. The ink tank unit has a container with a partition wall that defines and separates a first ink accumulating chamber and a second ink accumulating chamber, the partition wall having an upstream side facing the first ink accumulating chamber and a downstream side facing the second ink accumulating chamber, and the partition wall has plural communication holes allowing fluid communication between the first ink accumulating chamber and the second ink accumulating chamber. A diaphragm opposes the downstream side of the partition wall and defines a third ink accumulating chamber between the diaphragm and the partition wall and is located within the second ink accumulating chamber. The diaphragm has an opening. A projection is formed on the downstream side of the partition wall and aligns with and against the opening so that when part of the diaphragm moves away from the partition wall the opening is not blocked, the projection separating the communication holes from the diaphragm. An ink

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supply port leads to the second ink accumulating chamber and through which, when the ink tank unit contains ink, ink flows from the second ink accumulating chamber to the ink-jet recording apparatus.

Claim 17 involves a selective ink supply system to be located in an ink container between an ink chamber containing an ink and an ink supply port downstream of the ink chamber through which the ink flows to an ink-jet recording apparatus upon which the ink container is detachably mounted. The system includes a wall having an upstream side, a downstream side, and plural communication holes allowing fluid communication between the upstream and downstream sides. A projection is formed on the downstream side of the wall, and a diaphragm opposes the downstream side of the wall, the diaphragm having an opening that is aligned with the projection, the diaphragm being urged against the projection so that the opening is blocked. The projection separates the communication holes from the diaphragm and the diaphragm separates from the projection when a pressure difference across the diaphragm exceeds a particular value.

The Office Action **admits** at page 14 that Betschon does not suggest a partition wall having plural communication holes.

Suga only teaches that there are four holes passing through the valve seat 404 as shown in Fig. 4C, and that those holes are closed by the disc valve 401 as shown in Fig. 4A and that the hole in the disc valve 401 is closed by the valve seat 406. In this connection, Suga specifically states that “[i]n the absence of the stream of the ink, also a movable portion 405 lies in close contact with a valve seat 406 so as to blockade an ink outflow port 402” (col. 6, lines 59-61). In contrast, in Betschon, the penetration opening 19 is separated from the membrane 24 not just when the bore 36 of the membrane 24 is separated from the cylindrical protrusion 37 but

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also when the bore 36 of the membrane 24 is contacted with the cylindrical protrusion 37. Therefore, Applicants respectfully submit that were one having ordinary skill in the art to modify Betschon's arrangement in accordance with the teaching of the Suga, one of such ordinary skill would replace Betschon's intermediary wall 17 with Suga's integral valve seat member 404, 406 arranged so that the four holes (ink flow port 402) of the valve seat member 404, 406 are closed by Betschon's membrane 24 (it is believed this also would require the replacement of Betschon's membrane 24 and the spring 38 with Suga's disc valve 401), rather than simply providing another opening in Betschon's intermediary wall 17.

The remaining rejected claims, claims 12-16 and 18-24, all ultimately depend from and so incorporate by reference all the features of independent claims 11 and 17, which have been shown to patentably distinguish over the cited art. These claims are therefore patentable at least for the same reasons as their respective base claims.

For all the foregoing reasons, favorable reconsideration and withdrawal of this rejection are respectfully requested.

CONCLUSION

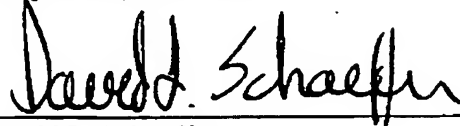
Applicants respectfully submit that all outstanding objections and rejections have been addressed and are now either overcome or moot. Applicants further submit that all claims pending in this application are patentable over the prior art. Favorable reconsideration and withdrawal of those rejections and objections is respectfully requested.

The Commissioner is authorized to charge any fees now or hereafter due in connection with the prosecution of this application to Deposit Account No. 19-4709.

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In the event that there are any questions, or should additional information be required, please contact Applicants' attorney at the number listed below.

Respectfully submitted,



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